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SERVICE DESIGN AND THE NEXT GENERATION TECHNOLOGIES IN GEORGIA

ABSTRACT. The work provides study and analysis of the queue management substance and significance. Research was conducted on the basis of Tbilisi Public Service Hall example. The work demonstrates that dealing with the queue management problem is of decisive importance for improvement of effectiveness of the service companies.Research conducted within this work is based on the results of 10-day observations. In the research the methods of quantitative analysis were applied. On the basis of the data obtained based on exponential distribution and Poisson distribution of services the econometric model was built. Suitability of this model is demonstrated, the relevant conclusions were made for improving queue management effectiveness.

KEY WORDS: Service Design, Technologies, Public Service Hall, queue management.

In discussion of service designing, the queues and their management are at the central place. The queues often emerge in the course of service process and dealing with the problems caused by their growth is of great significance for improvement of the effectiveness of service companies. Currently there is powerful

mathematical base for dealing with this problem and it is widely applied.

In many cases, we cannot receive required services. Queues emerge where the handling capacity of the service companies are lower than intensity of incoming flow. Handling capacity of the service companies is their ability to fulfill one or another number of applications entered into the service system in unit of time. Effective queue management is of increasing significance and hence, the role of queue manager becomes more important. Gradually the service companies introduce the state of art technological tools and equipment.

We have studied the queue management case on the example of TbilisiPublic Service Hall. In Georgia there are 13 branches of Public Service Hall (in Batumi, Rustavi, Mestia, Kutaisi, Ozurgeti, Gurjaani, Kvareli, Telavi, Marneuli, Gori, Akhaltsikhe and Tbilisi). This service entity offers over 300 types of services and provides service to up to 18.000 customers. Top five most demanded services are as follows: electronic identity card, marriage registration, passport, birth registration and propertyregistration [http://psh.gov.ge/].

For queue management Public Service Hall applies technologies provided by the company Next Generation Technology. This company is responsible for proper operation of the equipment. In case of failure the information is promptly reported to the company to recover the problems. Though, 3-year work experience of Public Service Hall, as the manager has stated, no any failures of the equipment has taken place.

Public Service Hall is the service entity where demand hardly can be managed. It may be categorized as the multichannel and multistage structure. For servicing of its consumers the entity applies the priority rule widespread in the practice — «first in first serviced». At the entrance the consumer is met by the area consultants and they provide to him/her the information about the issue interesting for him/her and point to the relevant operators. Service hall is divided into 3 parts: self-service area, prompt service area and long service area.

In the self-service area there are installed the automated systems allowing the customers obtaining of various services independently: excerpt about the property or business, biometric photo for the passport, cash from the ARM, remote payments etc.

In the prompt service area the customer can receive all services that require no more than 5 minutes in average. For example, the ready passports, identity cards, apostilled or legalized documents, registration decision and excerpts about real property and business can be obtained in this area.

In the long service area the customer can receive the services requiring more than 5 minutes, such as submission of application for passport issuance, submission of the documents required for business registration, retrieving of the biographical data from the archive and submission of applications for any other services.

Such dividing of the service area minimizes the risk of emergence of the long and chaotic queues, better organizes customers' movement and puts it into order and the sequence of the customers is controlled by the special integrated queue management electronic system. Information-advertising banners and signs provide additional advantage, making movement of the consumers within the building as simple as possible.

Public Service Hall customers have unique opportunity to receive state services through Just Drive. Just Drive allows the customers obtaining ready passports, birth certificates and other ready documents without entering into the building; moreover, they can stay in their cars and receive the documents at the Just Drive window in the area adjacent to Public Service Hall.

And still, when the queues emerge in the Public Service Hall? There are the periods when, by the governmental decision various actions are announced, for example, issuance of the identity cards for free of any charge, issuance of school leave certificates to the school graduates. In such periods the flow of customers increases and respectively the pending period increases as well.

To clarify the customers' attitude towards the Public Service Hall, we have conducted the market research. In the course of research, in March 2015, 300 respondents were interviewed, 163 of them were females, 137 — males. Majority of them (60 %) were within 21-30 age group. Research showed that 22 % of the respondents are fully satisfied with the services, 50 % — are satisfied, 20 % are unsatisfied and 8 % are absolutely unsatisfied. In the studied period the most demanded service was issuance of electronic ID cards. Research showed that 54 % of the customers use the area of prompt services most frequently. To the question: «how much time you have to spend in queue at Public Service Hall?» — the answers were non-uniform: 46 % of the respondents specified 0-15 minutes; 36 % — 15-30 minutes; 12 % — up to 1 hour; and 6 % — over 1 hour. In addition, 52 % of the respondents think that Public Service Hall effectively manages the queues and 42 % does not share this opinion.

For gaining of in=depth understanding of this issue, we observed the situation with respect of queues at Public Service Hall, from 1 to 14 October, from 17:00 to 18:00, to identify the problems. For this we

have applied the simple model of queues management and calculated the workload of the service personnel, average number of customers in the queue [Kharkheli M., Operative Management, Tbilisi, 2010, pp. 164—169]. From 17:00 to 18:00,to receive the services at Public Service Hall, 10 customers visited the long service area and submitted applications on passport issuance. The operator has spent 5 minutes with each of the clients and service intensity was μ = 60 : 5 = 12; personnel workload was $p = \frac{\lambda}{\mu}$ = 10 / 12 = 83.3 %; average number of customers in the queue was $n_1 = \frac{\lambda^2}{\mu(\mu-\lambda)} = \frac{10^2}{12(12-10)}$ = 4.16; average number of clients that have logged in the system was $n_s = \frac{\lambda}{\mu-\lambda} = \frac{10}{12-10} = 5\ Clients$, average time spent in the queue was: $t_1 = \frac{\lambda}{\mu(\mu-\lambda)} = \frac{10}{12(12-10)}$ = 0,41 hr or 24,9 minutes; average time spent in the system was $t_s = \frac{1}{\mu-\lambda} = \frac{1}{12-10} = 0{,}5\ hr\ or\ 30\ min$.

Results of calculations are presented in Table 1.

Table 1

QUEUE PARAMETERS AT TBILISI PUBLIC SERVICE HALL

Date	Operator s' work load	Average number of clients in the queue n_1	Average number of clients within the system n_s	Average time spent in queue t_1 (Min)	Average time spent in the system t_s (Min)
01.10.2015	91.6 %	10,08	11	54.8	60
02.10.2015	83.3 %	4.16	5	24,9	30
05.10.2015	75 %	2.25	3	15	19.8
06.10.2015	66.6 %	1.3	2	9.9	15
07.10.2015	75 %	2.25	3	15	19.8
08.10.2015	83.3 %	4.16	5	24,9	30
09.10.2015	66.6 %	1.3	2	9.9	15
12.10.2015	58.3 %	0.81	1.4	6.9	12
13.10.2015	50 %	0.5	1	4.9	9.9
14.10.2015	91.6 %	10,08	11	54.8	60

Based on these data we have built a simple regressive model that showed the correlation between the average time spent in the queue and average number of clients in the queue, as well as the correlation between average number of clients within the system and average time spent in the system. In the former case we took average time spent in the queue (y) as a resulting variable and average number of clients in the queue as a factor variable (x). In the latter case the resulting variable was average time spent within the system and factor variable was average number of clients in the system.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,999784333
R Square	0,999568712
Adjusted R Squa	0,999514801
Standard Error	0,407463525
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3078,311788	3078,312	18541,08436	9,46244E-15
Residual	8	1,328212192	0,166027		
Total	9	3079,64			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	3,108498785	0,189882891	16,37061	1,95299E-07	2,670628053	3,54636952	2,670628053	3,546369518
X Variable 1	5,148143457	0,037807945	136,1657	9,46244E-15	5,060958179	5,23532874	5,060958179	5,235328735

We have obtained the equation: Y=3,11 + 5,15x, clearly showing that if the average number of clients in the queue increases by 1 person, than average time in queue would increased by slightly more than 5 minutes. x coefficient is statistically significant, as $t_b > t_{Cr}$.

SUMMARY OUTPUT

Regression Statistics	
Multiple F	0,999990633
R Square	0,999981267
Adjusted I	0,999978925
Standard E	0,085267587
Observati	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regressio	1	3104,806836	3104,807	427038,1126	3,36761E-20
Residual	8	0,058164492	0,007271		
Total	9	3104,865			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	4,917011242	0,043411722	113,2646	4,12563E-14	4,816903631	5,017118853	4,816903631	5,017118853
X Variable	5,007429901	0,007662695	653,4815	3,36761E-20	4,989759693	5,025100108	4,989759693	5,025100108

In the latter case we obtained the equation: Y=4,92 + 5x that showed that if the average number of clients within the system changes by 1 unit, then the average time in the system would increase by about 5 minutes. And in this case x coefficient is statistically significant as well, $ast_b > t_{Cr}$.

This clearly shows that the queue management, in the service sector, is a quite significant problem. To ensure effective queue management, the Public Service Hall has to regularly seek the innovative technologies and introduce them into the practice. We regard that introduction of the innovative project «Just Drive», allowing the customers to be serviced without coming out of their cars, would reduce the queues at Public Service Gall and improve the customers' satisfaction.

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ФОРМУВАННЯ ІНФОРМАЦІЙНОГО СЕРЕДОВИЩА ФУНКЦІОНУВАННЯ СИСТЕМИ УПРАВЛІННЯ НЕМАТЕРІАЛЬНИМИ АКТИВАМИ

АНОТАЦІЯ. Розглянуто основні структурні елементи інформаційного забезпечення функціонування системи управління нематеріальними активами. Особливу увагу приділено вхідним і вихідним